

## CLAIMS

1. A respiratory assist system, comprising:
  - 5 an artificial rib cage configured to fit sealingly over a patient's chest wall and abdomen to form a closed system, the artificial rib cage comprising a spine element, a plurality of rib elements connected to the spine element, a sternum component configured for placement against a patient's chest, and an abdomen component configured for placement against a patient's abdomen, the sternum component and abdomen component being attached to the rib elements;
  - 10 wherein the sternum component and the abdomen component are movably connected to each other with a translating element, such that movement of the sternum component with respect to the abdomen component effects a change in the size and shape of the artificial rib cage to create a negative and positive pressure within the
  - 15 artificial rib cage during a cycle of respiration.
2. The system of claim 1, wherein the translating element is a cylinder and piston assembly.
- 20 3. The system of claim 2, wherein the cylinder and piston assembly are fixedly attached to the sternum component and the abdomen component.
4. The system of claim 1, wherein the translating element is a motorized screw lever.
- 25 5. The system of claim 1, wherein the artificial rib cage includes a foam liner adapted to be disposed between the artificial rib cage and the patient's chest.
6. The system of claim 1, wherein the abdomen component and the sternum component are slidably movable with respect to one another.
- 30 7. The system of claim 1, wherein at least one of the plurality of rib elements is movably connected to the sternum component with a ball and socket joint.

- 13 -

8. The system of claim 1, wherein at least one of the plurality of rib elements is movably connected to the abdomen component with a ball and socket joint.

5 9. The system of claim 1, wherein at least one of the plurality of rib elements is movably connected to the spine element with a ball and socket joint.

10 10. The system of claim 1, wherein system further includes an automatic feedback system for adjusting a physiological parameter selected from the group consisting of tidal volume, respiratory rate, and inspiratory to expiratory ratio, including high frequency oscillatory ventilation.

11. The system of claim 1, wherein the system is automated.

15 12. The system of claim 1, wherein movement of the sternum component with respect to the abdomen component causes a change in the cross-sectional dimensions of the artificial rib cage.

20 13. The system of claim 1, wherein movement of the sternum component and the abdomen component towards each other decreases the angle between the plurality of rib elements and the spine element.

25 14. The system of claim 1, wherein movement of the sternum component and the abdomen component away from each other increases the angle between the plurality of rib elements and the spine element.

15. The system of claim 1, wherein the artificial rib cage includes a cover.

16. The system of claim 1, wherein the artificial rib cage includes a liner.

30 17. The system of claim 1, wherein the artificial rib cage forms a jacket for placement around a patient's chest and lower trunk.

- 14 -

18. The system of claim 1, further being configured to perform chest compressions for resuscitating a patient experiencing cardiovascular collapse or cardiac arrest.

5 19. The device of claim 1, wherein the spine element has four rib elements attached thereto, and a superior-most rib element and an inferior-most rib element are rigidly attached to the spine component, and a first intermediate rib and a second intermediate rib element are pivotally connected to the rib element by a joint.

10 20. The device of claim 19, wherein the superior-most rib element is pivotally connected to the sternum component by a joint and the inferior-most rib element is pivotally connected to the abdomen component by a joint.

15 21. The device of claim 19, wherein one of the intermediate rib elements is movably connected to the sternum by a joint and the other of the intermediate rib elements is movably connected to the abdomen component by a joint.

20